

REMARKS

Applicants have amended the title of the invention, canceled claims 2 and 8, without prejudice or disclaimer of their subject matter, and amended claim 1, 3, 7, and 9 to more appropriately define the present invention. Claims 1, 3-7, and 9-12 remain pending and under current examination.

Regarding the Office Action:

In the Office Action, the Examiner objected to the title of the invention; rejected claims 1, 4-7, and 10-12 under 35 U.S.C. § 103(a) as being unpatentable over Imai, et al. (U.S. Patent No. 5,847,419) ("Imai") in view of Nishikawa, et al. ("Direct Growth of Single Crystalline CeO₂ High-k Gate Dielectrics," Extended Abstracts of the 2001 Int'l Conf. on Solid State Devices and Mat'ls, Tokyo, 2001, pp. 174-175) ("Nishikawa"); and rejected claims 2, 3, 8, and 9 under 35 U.S.C. § 103(a) as being unpatentable over Imai and Nishikawa as applied to claims 1 and 7, and further in view of Hisamoto, et al. (U.S. Patent App. Pub. No. US 2003/0137017 A1) ("Hisamoto"). Applicants traverse the rejections for the following reasons.¹

Objection to the Title:

The Examiner objected to the title of the application as not descriptive. Applicants have amended the title of the application, as indicated above, to be even more clearly indicative of the invention to which the claims are directed. Applicants request that the objection to the title be withdrawn.

Claim Amendments:

Support for the amendments to claims 1, 3, 7, and 9 may be found in the specification at, for example, page 12, lines 25-27.

Rejection of Claims 1, 4-7, and 10-12 under 35 U.S.C. § 103(a):

Applicants traverse the rejection of claims 1, 4-7, and 10-12 under 35 U.S.C. § 103(a) because a *prima facie* case of obviousness has not been established based on Imai and Nishikawa. Applicants respectfully disagree with the Examiner's arguments and conclusions. A *prima facie* case of obviousness has not been established.

"To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)." M.P.E.P. § 2142, 8th Ed., Rev. 2 (May 2004), p. 2100-128.

At least the first requirement for establishing a *prima facie* case of obviousness has not been established, because Imai and Nishikawa, both alone and in combination, fail to teach or suggest all the elements of Applicants' claimed invention.

Applicants' independent claims 1 and 7 each recite, in part,

a buffer layer made of a monocrystal semiconductor material and formed on the substrate; a strained-Si layer formed on the buffer layer and having a lattice constant different from that of the buffer layer; a monocrystal insulating film formed on the strained-Si layer, the monocrystal insulating film being made of a material having a rare earth structure with a lattice constant different from that of Si; and a monocrystal semiconductor electrode formed on the insulating film (claim 1); and

a buffer layer made of a monocrystal semiconductor material and formed on the substrate; a strained-silicon layer formed on the buffer layer and having a lattice constant different from that of the buffer layer; a source region and a drain region formed in the strained-silicon layer so as to be separated from each other; a gate insulating film formed on the strained-silicon layer sandwiched between the

(...continued)

¹ The Office Action contains statements characterizing the related art and the claims. Regardless of whether any such statements are specifically identified herein, Applicant declines to automatically subscribe to any statements in the Office Action.

source region and the drain region and made of a monocrystal rare earth oxide having a lattice constant different from that of silicon; and a monocrystal semiconductor gate electrode formed on the gate insulating film (claim 7).

The Examiner admitted that Imai “does not disclose the gate insulating film 20 made of a monocrystal rare earth oxide having a lattice constant different from that of silicon 16” (Office Action, p. 3), and Applicants agree with the Examiner’s admission.

The Examiner then cited Nishikawa, however, to allegedly cure Imai’s deficiencies pertaining to independent claims 1 and 7, alleging “it would have been obvious to use the monocrystal rare earth oxide of CeO₂ [in Nishikawa] as an alternative dielectric for the gate oxide 20 of Imai” (*Id.*). Applicants dispute the Examiner’s combination of Imai and Nishikawa.

First, even if it were proper to combine Nishikawa with Imai, which Applicants do not concede, the combination still fails to teach or suggest the above-quoted elements of independent claims 1 and 7. For example, the Examiner incorrectly alleged that Imai teaches “a buffer layer 15 made of monocrystal SiGe (column 10, lines 8-16) and formed on the substrate 11” (Office Action, p. 2). Instead, Imai teaches a relaxed SiGe layer 15 grown on thermal oxide film 14 and first SiGe layer 12. Because other intermediate layers are present, Imai’s relaxed SiGe layer 15 is *not* formed on the substrate 11. Therefore, Imai does not teach or suggest “a buffer layer made of a monocrystal semiconductor material *and formed on the substrate*” (emphasis added), according to claims 1 and 7.

Furthermore, Nishikawa does not cure this deficiency. The Examiner relied on Nishikawa for its teaching of a single crystal CeO₂ high-k gate dielectric material. Nishikawa teaches that “CeO₂ was grown on p-Si(111) substrates by molecular beam epitaxy (MBE)” (Nishikawa, p. 174, left column). In view of Ce being a rare earth metal, CeO₂ is not a semiconductor material, whether it is monocrystalline or not. Therefore, Nishikawa does not

teach or suggest “a buffer layer made of a monocrystal semiconductor material and formed on the substrate,” according to claims 1 and 7.

Second, Imai and Nishikawa both fail to teach or suggest, at least, Applicants’ claimed “*monocrystal semiconductor electrode* formed on the insulating film” (claim 1, emphasis added), and “*monocrystal semiconductor gate electrode* formed on the gate insulating film” (claim 7, emphasis added). Imai’s gate electrode 21 is *polycrystalline* Si, and source/drain electrodes 27a/27b and 29a/29b are formed by deposition of a metal conductive film, such as Al. See Imai, Fig. 3K and corresponding description. Such Al films are *polycrystalline*. Moreover, Nishikawa does not even teach or suggest an electrode in its extended abstract on high-k gate dielectric materials.

Therefore, Imai and Nishikawa, taken alone or in combination, do not teach or suggest each and every element of independent claims 1 and 7, and the Examiner’s reliance on Imai and Nishikawa fails to establish *prima facie* obviousness. Claims 1 and 7 are allowable, and dependent claims 4-6 and 10-12 are also allowable at least by virtue of their respective dependence from allowable base claims 1 or 7. Therefore, the improper 35 U.S.C. § 103(a) rejection should be withdrawn.

Rejection of Claims 2, 3, 8, and 9 under 35 U.S.C. § 103(a):

Applicants respectfully traverse the rejection of claims 2, 3, 8, and 9 under 35 U.S.C. § 103(a) as being unpatentable over Imai and Nishikawa as applied to claims 1 and 7, and further in view of Hisamoto. Applicants disagree with the Examiner’s arguments and conclusions.

A *prima facie* case of obviousness has not been established because, among other things, Imai, Nishikawa, and Hisamoto, do not teach or suggest each and every feature of Applicants’ claims.

First, Applicants note that this rejection has been rendered moot with respect to claims 2 and 8, due to Applicants' cancellation of these claims.

Further, Applicants note that dependent claims 3 and 9 include all limitations recited in base claims 1 and 7, respectively. *See* M.P.E.P. § 608.01(n)(III). Applicants have already demonstrated previously herein that Imai in view of Nishikawa do not teach or suggest all the elements of Applicants' independent claims 1 and 7.

In addition, the Examiner admitted that "[n]either Imai nor Nishikawa discloses the gate electrode made of crystalline SiGe." Office Action, p. 3. In an attempt to cure these deficiencies, the Examiner cited Hisamoto. Applicants note, however, that Hisamoto still does not cure the deficiencies of Imai and Nishikawa as applied to Applicants' independent claims 1 and 7. For example, Hisamoto discloses that the Si-Ge gate electrode layer is deposited by CVD and polycrystallized by heating an amorphous semiconductor layer. *See* Hisamoto, par. [0051]. Hisamoto does not teach a monocrystal electrode or monocrystal gate electrode according to the claimed invention. That is, Hisamoto, taken alone or in combination with Imai and Nishikawa, also fails to teach or suggest Applicants' claimed "*monocrystal semiconductor electrode* formed on the insulating film" (claim 1, emphasis added), and "*monocrystal semiconductor gate electrode* formed on the gate insulating film" (claim 7, emphasis added).

The Examiner has therefore not met at least one of the essential criteria for establishing a *prima facie* case of obviousness. The Examiner's citation of Imai, Nishikawa, and Hisamoto against Applicants' dependent claims 3 and 9 is therefore not sufficient for the Examiner to establish *prima facie* obviousness. Thus, dependent claims 3 and 9 are allowable. Therefore, the improper 35 U.S.C. § 103(a) rejection of claims 3 and 9 should be withdrawn.

Conclusion:

In view of the foregoing, Applicants request reconsideration of the application and withdrawal of the rejections. Pending claims 1, 3-7, and 9-12 are in condition for allowance, and Applicants request a favorable action.

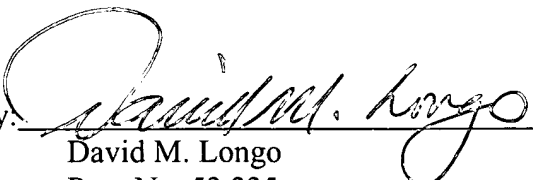
Should the Examiner continue to dispute the patentability of the claims after consideration of this Amendment, Applicants encourage the Examiner to contact the undersigned representative by telephone to discuss any remaining issues or to resolve any misunderstandings.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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